United States Patent Office

3,482,241
Patented Dec. 2, 1969

3,482,241

TOUCH DISPLAYS

Eric Arthur Johnson, Malvern, England, assignor to Minister of Aviation in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland, London, England

Filed Aug. 2, 1966, Ser. No. 569,731
Claims priority, application Great Britain, Aug. 5, 1965, 33,524/65; June 28, 1966, 28,883/66
Int. Cl. G09b *13/00*; H05b *41/00*; G06k *1/00*
U.S. Cl. 340—337 7 Claims

ABSTRACT OF THE DISCLOSURE

A plurality of touch-sensitive contacts, placed adjacent the screen of a cathode ray tube, which may be selectively actuated for indicating which portion of the image on the cathode ray screen is to be exmained in further detail. The position of the actuated contact with respect to the viewing screen indicates which portion of the image has been selected to an output means such as a data processing system. Either resistance change or capacitance change across the actuated contact may be sensed.

The presnet invention relates to touch displays.

A very large number of so-called automatic data processing systems require the co-operation of human operators to achieve satisfactory operation. In many of these systems it is necessary to reduce operator reaction time to a minimum, which in turn demands an arrangement where communciations between the operator and the system and vice versa is the best possible. This requires that the methods of presenting information to and receiving instructions from the operator should be rapid and easy.

For the presentation of information to the operator, a method often used at the present time is some form of printing, usually electromechanical. Although the normal teleprinter output is rather slow in relation to the speed with which an operator can absorb information, an extension of the technique to line printing cn overcome this. Alternatively an electronic data display is sometimes used, and in the case of line printing or electronic data display time required to produce a readable output from the system does not really add significantly to the time required for an operator to accept information. There is also a considerable amount of flexibility of format available to ease understanding.

The situation is not so satisfactory in the case of accepting instructions from an operator. A current method is to make use of some form of keyboard with either a standard set of alpha-numeric keys or some special keys, usually called function keys, or both. The function keys as their name implies, usually provide control instructions to the system whilst the alpha-numeric keybord is used for information input, interpreted by the system in acocrdance with the most recent control instructions. The process can be rather slow and clumsy especially when a fairly large system is involved with several operators having a wide range of input possibilities in the interests of flexibility.

It is an object of the invention to provide means for feeding data (instructions or information) to a system by using a touch display by means of which means responsive to touch are associated with a display. The means responsive to touch may be connected to a data input of the system.

According to the present invention there is provided, for use with means for displaying data, means responsive to touch having an output indicative of the area touched.

The means responsive to touch may include a transparent screen responsive to touch suitable for fixing in front of the means for displaying data.

Preferably the means responsive to touch is connected to a data input of a data processing system. In such a case it is highly advantageous for the means for displaying data to be connected to a data output of the data processing system in such a manner that the data displayed may be altered under the control of the data processing system.

A convenient means for displaying data is, of course, provided by the cathode ray tube, which may be controlled to write output information on its screen; the invention provides a method of feeding more information to the data processing system, so continuing the programme. For example, the cathode ray tube may display a list of items and it may be desired to examine one of the items in further detail. It is frequently troublesome to indicate to the data processing system which item is the one to be examined. Under these circumstances it should be possible to provide sites on the cathode ray tube which are responsive to touching by the hand of the operator. The effect would be that the operator touches the place on the cathode ray tube screen where the item is displayed and this signals back to the data processing system that that particular item is selected (for further examination, say).

Such a system may be arranged by embedding electric wires in the screen, one to each site on the cathode ray tube, and using the operator's natural capacitance to earth, which is of the order of 100 pf.

In an alternative arrangement a pair of wires may be arranged close to one another and the operator's finger, touching the two wires, would short them out via the natural skin resistance of the finger plus the contact resistance, which is of the order of 500,000 ohms.

Embodiments of the invention will be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a circuit diagram of a touch sensitive system;

FIGURE 2 is a more complete circuit diagram of part of a display incorporating a touch-sensitive system;

FIGURE 3 is a circuit diagram of part of an alternative display incorporating a touch sensitive system;

FIGURE 4 is a circuit diagram of part of a further alternative display incorporating a touch sensitive system; and

FIGURE 5 is a diagrammatic representation of the logic steps taken in a process using a data processing system and input and output facilities.

In FIGURE 1 the primary winding of a transformer T1 is fed from a high frequency source S (say 3000 cycles per second) and the secondary winding is centre-tapped. One half L1 of the secondary winding is connected bteween the centre tap CT1 and a terminal connected to earth via a variable capacitor C1 and a variable resistor R1 in series and the other half L2 of the secondary winding is connected between the centre tap CT1 and a sensitive electrode SE1. The centre tap CT1 is connected to earth via the primary winding L3 of a transformer T2.

The action of the circuit is as follows. The windings L1 and L2, together with the capacitor C1 and the resistor R1, and the self capacity of the sensitive electrode SE1 form a bridge circuit which is adjusted to be balanced at the frequency f_0 of the source S. When the sensitive electrode SE1 is touched by an operator the capacitance to earth presented to it is sufficient to throw the bridge off balance and an alternating potential appears across the winding L3 and hence a signal appears in the secondary winding of the transformer T2.